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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1.	PO 1.	PO 1.	PO 1.	PO 1.					
Formulate	Formulate	Formulate	Formulate	Formulate	Formulate	Formulate	Formulate	Formulate	Formulate
questions to	questions to	questions to	questions to	questions to					
collect data in	collect data in	collect data in	collect data in	collect data in					
contextual	contextual	contextual	contextual	contextual	contextual	contextual	contextual	contextual	contextual
situations.	situations.	situations.	situations.	situations.	situations.	situations.	situations.	situations.	situations.
	PO 2. Make a	PO 2. Make a	PO 2.	PO 2.	PO 2.	PO 2.	PO 2.	PO 2.	PO 2.
	simple	simple	Construct a	Construct a	Construct a	Construct a	Construct a	Construct	Organize
	pictograph or	pictograph or	horizontal	single-bar	double-bar	histogram,	circle graph	box-and-	collected data
	tally chart	tally chart	bar, vertical	graph, line	graph, line plot, frequency	line graph,	with	whisker plots.	into an
	with	with	bar,	graph or two	table, or three-	scatter plot,	appropriate		appropriate
	appropriate	appropriate	pictograph, or	-set Venn	set Venn	or stem-and-	labels and		graphical
	labels from	labels from	tally chart	diagram with	diagram with	leaf plot with	title from		representation.
	organized	organized	with	appropriate	appropriate	appropriate	organized		
	data.	data.	appropriate	labels and	labels and title	labels and	data.		
			labels and	title from	from organized	title from			
			title from	organized	data.	organized			
			organized	data.		data.			
			data.						
							PO 3.	PO 3.	PO 3.
							Determine	Determine the	Display data
							when it is	appropriate	as lists,
							appropriate to	type of	tables,
							use	graphical	matrices, and
							histograms,	display for a	plots.
							line graphs,	given data set.	1
							double bar		
							graphs, and		
							stem-and-leaf		
							plots.		

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
									PO 4. Construct equivalent displays of the same data
PO 2. Interpret a pictograph.	PO 3. Interpret pictographs using terms such as most, least, equal, more than, less than, and greatest.	PO 3. Interpret pictographs using terms such as most, least, equal, more than, less than, and greatest.	PO 3. Interpret data found in line plots, pictographs, and single-bar graphs (horizontal and vertical).	PO 3. Interpret graphical representations and data displays including single-bar graphs, circle graphs, two- set Venn diagrams, and line graphs that display continuous data.	PO 3. Interpret graphical representations and data displays including bar graphs (including double-bar), circle graphs, frequency tables, threeset Venn diagrams, and line graphs that display continuous data.	PO 3. Interpret simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	PO 4. Interpret data displays including histograms, stem-and – leaf plots, circle graphs and double line graphs.	PO 4. Interpret boxand-whisker plots, circle graphs, and scatter plots.	PO 5. Identify graphic misrepresentations and distortions of sets of data.

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 3. Answer questions about a pictograph.	PO 4. Answer questions about pictographs using terms such as most, least, equal, more than, less than, and greatest.	PO 4. Answer questions about a pictograph using terms such as most, least, equal, more than, less than, and greatest.	PO 4. Answer questions based on data found in line plots, pictographs, and single-bar graphs (horizontal and vertical).	PO 4. Answer questions based on graphical representation s and data displays including single-bar graphs, circle graphs, two-set Venn diagrams, and line graphs that display continuous data.	PO 4. Answer questions based on graphical representations, and data displays including bar graphs (including double-bar), circle graphs, frequency tables, three-set Venn diagrams, and line graphs that display continuous data.	PO 4. Answer questions based on simple displays of data including double bar graphs, tally charts, frequency tables, circle graphs, and line graphs.	PO 5. Answer questions based on data displays including histograms, stem-and - leaf plots, circle graphs, and double line graphs.	PO 5. Answer questions based on boxand-whisker plots, circle graphs, and scatter plots.	
				PO 5. Identify the mode(s) of given data.	PO 5. Identify the mode(s) and mean (average) of given data.	PO 5. Find the mean, median (odd number of data points), mode, range, and extreme values of a given numerical data set.	PO 6. Find the mean, median, mode, and range of a given numerical data set.	PO 6. Solve problems in contextual situations using the mean, median, mode, and range of a given data set.	PO 6. Identify which of the measures of central tendency is most appropriate in a given situation.

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 4.	PO 5.	PO 5.	PO 5.	PO 6.	PO 6.	PO 6.	PO 7.	PO 7.	PO 7. Make
Formulate	Formulate	Formulate	Formulate	Formulate	Formulate	Identify a	Interpret	Formulate	reasonable
questions	questions	questions	questions	predictions	reasonable	trend	trends from	reasonable	predictions
based on data	based on	based on	based on	from a given	predictions	(variable	displayed	predictions	based upon
displayed in	graphs,	graphs,	graphs,	set of data.	from a given	increasing,	data.	based on a	linear patterns
graphs,	charts, and	charts, and	charts, and		set of data.	decreasing,		given set of	in data sets or
charts, and	tables.	tables.	tables to			remaining		data.	scatter plots.
tables.			solve			constant)			
			problems.			from			
						displayed			
					PO 7.	data. PO 7.	PO 8.	PO 8.	PO 8. Make
					Compare two				reasonable
					sets of data	Compare trends in data	Compare trends in data	Compare trends in data	predictions
					related to the	related to the	related to the	related to the	for a set of
					same	same	same	same	data, based on
					investigation.	investigation.	investigation.	investigation.	patterns.
					mvestigation.	mvestigation.	mvestigation.	mvestigation.	patterns.
PO 5. Solve	PO 6.	PO 6. Solve	PO 6. Solve	PO 7.	PO 8.	PO 8. Solve	PO 9. Solve	PO 9. Solve	PO 9. Draw
problems	Solve	problems	problems	Solve	Solve	contextual	contextual	contextual	inferences
based on	problems	using graphs,	using graphs,	contextual	contextual	problems	problems	problems	from charts,
simple	using graphs,	charts, and	charts and	problems	problems	using bar	using	using scatter	tables, graphs,
graphs,	charts, and	tables.	tables.	using graphs,	using graphs,	graphs, tally	histograms,	plots, box-	plots, or data
charts, and	tables.			charts, and	charts, and	charts, and	line graphs of	and-whiskers	sets.
tables.				tables.	tables.	frequency	continuous	plots, and	
						tables.	data, double	double line	
							bar graphs,	graphs of	
							and stem-	continuous	
							and-leaf	data.	
							plots.		

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
									PO 10.
									Apply the
									concepts of
									mean,
									median,
									mode, range,
									and quartiles
									to summarize
									data sets.
									PO 11.
									Evaluate the
									reasonable-
									ness of
									conclusions
									drawn from
									data analysis.

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
								PO 10.	PO 12.
								Evaluate the	Recognize
								effects of	and explain
								missing or	the impact of
								incorrect data	interpreting
								on the results	data (making
								of an	inferences or
								investigation	drawing
								(e.g., Susie's	conclusions)
								teacher	from a biased
								recorded a 39	sample.
								instead of a	
								93 for her last	
								quiz, what	
								will happen	
								to Susie's	
								average?).	
								PO 11.	PO 13. Draw
								Identify a line	a line of best
								of best fit for	fit for a
								a scatter plot.	scatter plot.
								PO 12.	PO 14.
								Distinguish	Determine
								between	whether
								causation and	displayed
								correlation.	data has
									positive,
									negative, or
									no
									correlation.
									correlation.

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Concept 1: Data Analysis (Statistics)

Understand and apply data collection, organization and representation to analyze and sort data.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
									PO 15. Identify a normal distribution.
									PO 16. Identify differences between sampling and census.
									PO 17. Identify differences between biased and unbiased samples.

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Concept 2: Probability

Understand and apply the basic concepts of probability.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
Tamaci gai ten	Grade 1	PO 1. Name	PO 1.	PO 1.	PO 1. Find				
		the possible	Determine the	Determine the	the				
		outcomes for	probability	probability	probability				
		a probability	that a specific	that a specific	that a specific				
		experiment.	experiment.	experiment.	experiment.	experiment.	event will	event will	event will
		емрегинене.	сирегипене.	сирегипене.	емрегипене.	сирегипене.	occur in a	occur in a 2-	occur, with or
							single stage	stage	without
							probability	probability	replacement.
							experiment	experiment.	replacement.
							(e.g., Find the	емренинене.	
							probability of		
							drawing a red		
							marble from a		
							bag with 3		
							red, 5 blue,		
							and 9 black		
							marbles.).		
							,		

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Concept 2: Probability

Understand and apply the basic concepts of probability.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
		PO 2. Predict the most likely or least likely outcome in probability experiments. (e.g., Predict the chance of spinning one of the 2 colors on a 2-colored spinner.)	PO 2. Make predictions about the probability of events being more likely, less likely, equally likely or unlikely.	PO 2. Describe the probability of events as being more likely, less likely, equally likely, unlikely, certain, impossible, fair or unfair.	PO 2. Describe the probability of events as being: • certain (represented by "1"), • impossible, (represented by "0"), or • neither certain nor impossible (represented by a fraction less than 1).	PO2. Express probabilities of a single event as a decimal.	PO 2. Compare probabilities to determine the fairness of a contextual situation (e.g., If John wins when two or greater shows after a six-sided number cube is rolled and Joaquin wins otherwise, is this a fair game?).	PO 2. Solve contextual situations using probability (e.g., If the probability of Michelle making a free throw is 0.25, what is the probability that she will make three free throws in a row?).	PO 2. Determine simple probabilities related to geometric figures.
		PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.	PO 3. Predict the outcome of a grade- level appropriate probability experiment.

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Concept 2: Probability

Understand and apply the basic concepts of probability.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
		PO 4. Record	PO 4. Record	PO 4. Record	PO 4. Record	PO 4. Record	PO 4. Record	PO 4. Record	PO 4. Record
		the data from	the data from	the data from	the data from	the data from	the data from	the data from	the data from
		performing a	performing a	performing a	performing a	performing a	performing a	performing a	performing a
		grade-level	grade-level	grade-level	grade-level	grade-level	grade-level	grade-level	grade-level
		appropriate probability	appropriate probability	appropriate probability	appropriate probability	appropriate probability	appropriate probability	appropriate probability	appropriate probability
		experiment.	experiment.	experiment.	experiment.	experiment.	experiment.	experiment.	experiment.
		Сиренинени.	опротинене.	емрениене.	емрениене.	сирениене.	сирениене.	опротинене.	опротинене.
		PO 5.	PO 5.	PO 5.	PO 5.	PO 5.	PO 5.	PO 5.	PO 5.
		Compare the	Compare the	Compare the	Compare the	Compare the	Compare the	Compare the	Compare the
		outcome of	outcome of	outcome of	outcome of an	outcome of	outcome of	outcome of	outcome of
		an experiment	an experiment	an experiment	experiment to	an experiment	an experiment	an experiment	an experiment
		to predictions made prior to	to predictions made prior to	to predictions made prior to	predictions made prior to	to predictions made prior to			
		performing	performing	performing	performing	performing	performing	performing	performing
		the	the	the	the	the	the	the	the
		experiment.	experiment.	experiment.	experiment.	experiment.	experiment.	experiment.	experiment.
		Î	•	•	•	•	•	•	•
				PO 6. Make	PO 6. Make	PO 6. Make	PO 6. Make	PO 6.	PO 6.
				predictions	predictions	predictions	predictions	Distinguish	Distinguish
				from the results of	from the results of	from the results of	from the results of	between	between
				student-	student-	student-	student-	independent and	independent and
				generated	generated	generated	generated	dependent	dependent
				experiments	experiments	experiments	experiments	events.	events.
				using objects	using objects	using objects	using objects		
				(e.g., coins,	(e.g., coins,	(e.g., coins,	(e.g., coins,		
				spinners,	spinners,	spinners,	spinners,		
				number	number	number	number		
				cubes).	cubes).	cubes, cards).	cubes, cards).		

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Concept 2: Probability

Understand and apply the basic concepts of probability.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
		PO 6.	PO 6.	PO 7.					
		Compare the							
		results of two							
		repetitions of							
		the same							
		grade-level							
		appropriate							
		probability							
		experiment.							

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Concept 3: Discrete Mathematics – Systematic Listing and Counting

Understand and demonstrate the systematic listing and counting of possible outcomes.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1. Make	PO 1. Make	PO 1.	PO 1. Make a	PO 1. Find	PO 1. Find	PO 1.	PO 1.	PO 1.	PO 1.
arrangements	arrangements	Make	diagram to	all possible	all possible	Determine all	Determine all	Determine all	Determine
that represent	that represent	arrangements	represent the	combinations	combinations	possible	possible	possible	the number
the number of	the number of	that represent	number of	when 1 item	when 1 item	outcomes	outcomes	outcomes	of possible
combinations	combinations	the number of	combinations	is selected	is selected	involving a	involving the	involving the	outcomes for
that can be	that can be	combinations	available	from each of	from each of	combination	combination	combination	a contextual
formed by	formed by	that can be	when 1 item	two sets	2 sets of	of 3 sets of 3	of up to three	of two or	event using a
pairing items	pairing items	formed by	is selected	containing up	different	items, using a	sets of objects	more sets of	chart, a tree
taken from 2	taken from 2	pairing items	from each of	to three	items, using a	systematic	(e.g., How	objects (e.g.,	diagram, or
sets, using	sets, using	taken from 2	3 sets of 2	objects (e.g.,	systematic	approach	many outfits	If you roll a	the counting
manipulatives	manipulatives	sets, using	items (e.g., 2	How many	approach	(e.g., 3	can be made	six-sided	principle.
(e.g., How	(e.g., How	manipulatives	different	outfits can be	(e.g., shirts:	different	with 3 pants, 2	number cube	
many outfits	many ice	(e.g., How	shirts, 2	made with 3	tee shirt, tank	shirts, 3	tee shirts and	4 times, how	
can one make	cream cones	many types of	different	pants and 2	top,	different	2 pairs of	many	
with 2	can one make	sandwiches	hats,2	tee shirts?).	sweatshirt;	pairs of	shoes?).	possible	
different color	with 2	can one make	different		pants: shorts,	pants, and 3		outcomes are	
shirts and 2	different types	with 3	belts).		jeans).	different		possible?).	
different pairs	of ice cream	different types				belts).			
of pants?).	and 2	of fillings and							
	different types	2 types of							
	of cones?).	bread if only							
		one type of							
		bread and 1							
		kind of filling							
		is used for							
		each							
		sandwich?).							

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Concept 3: Discrete Mathematics – Systematic Listing and Counting

Understand and demonstrate the systematic listing and counting of possible outcomes.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
3						PO 2. Determine all possible arrangements given a set with four or fewer objects using a systematic list, table or tree diagram when order is not important.	PO 2. Determine all possible arrangements of a given set, using a systematic list, table, tree diagram, or other representation.	PO 2. Determine all possible arrangements given a set. (e.g., How many ways can you arrange a set of 7 books on a shelf?).	PO 2. Determine when to use combinations versus permutations in counting objects.
									PO 3. Use combinations or permutations to solve contextual problems.

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Concept 4: Vertex-Edge Graphs

Understand and apply vertex-edge graphs.

Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6	Grade 7	Grade 8	High School
PO 1. Color	PO 1. Find	PO 1. Find	PO 1.						
pictures with	pictures with	pictures with	maps with the	maps with the	maps with	the shortest	the shortest	Solve	
the least	the least	the least	least number	least number	the least	route on a	circuit on a	contextual	
number of	number of	number of	of colors so	of colors so	number of	map from one	map that	problems	
colors so that	colors so that	colors so that	that no	that no	colors so that	site to another	makes a tour	represented	
no common	no common	no common	common	common	no common	(vertex-edge	of specified	by vertex-	
edges share	graph).	sites (vertex-	edge graphs.						
the same		edge graph).							
color	color	color	color	color	color				
(increased	(increased	(increased	(increased	(increased	(increased				
complexity	complexity	complexity	complexity	complexity	complexity				
throughout	throughout	throughout	throughout	throughout	throughout				
grade levels).									